

Overview of Key Issues

Transatlantic Cooperation for Clean Air
Brussels Workshop

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5 February 2007
Brussels, Belgium

Clean Air Act: Brief history

- Air Pollution Control Act of 1955 (research)
 - Clean Air Act of 1963, Air Quality Act of 1967
 - 1970 Clean Air Act (modern era)
 - 1977 Amendments
 - 1990 Clean Air Act Amendments
 - Comprehensive and extensive amendments, culmination of lengthy Congressional process and House/Senate conference.
 - Called for 175 new regulations, over 30 guidance documents, over 50 research and investigation projects, 6 new panels.
 - Added titles on acid rain, federal permits, stratospheric ozone protection
 - Added new provisions affected compliance with National Ambient Air Quality Standards (NAAQS), fuel and motor vehicle standards, hazardous air pollutants (MACT and residual risk programs).

Power Sector

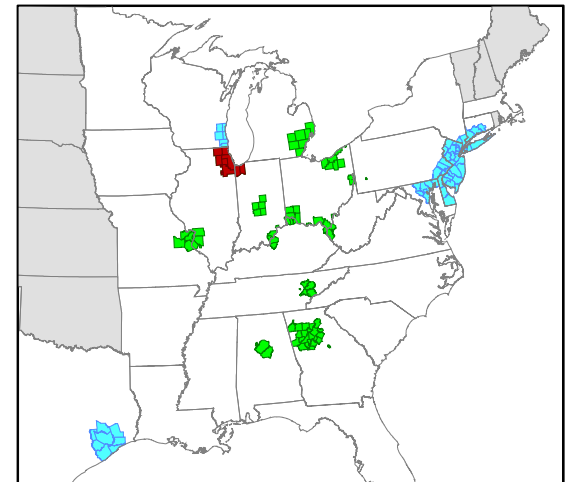


Current Areas of Focus

Transportation

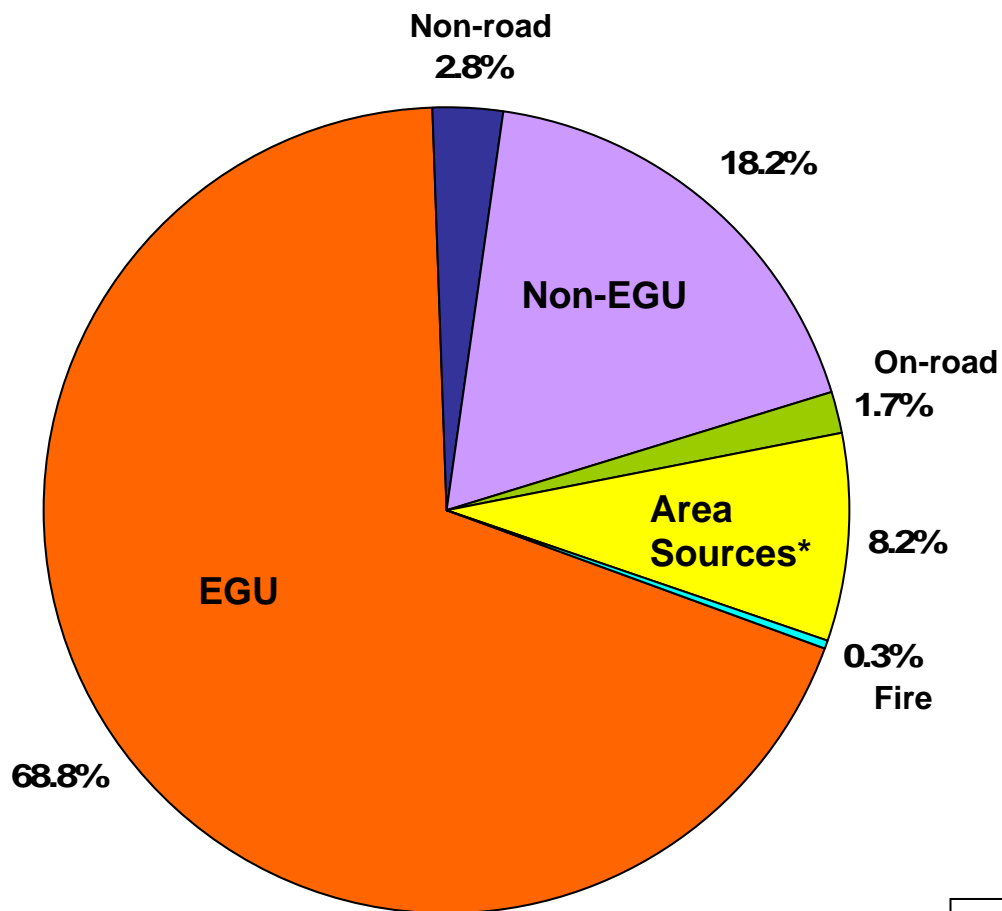


Air Quality Standards



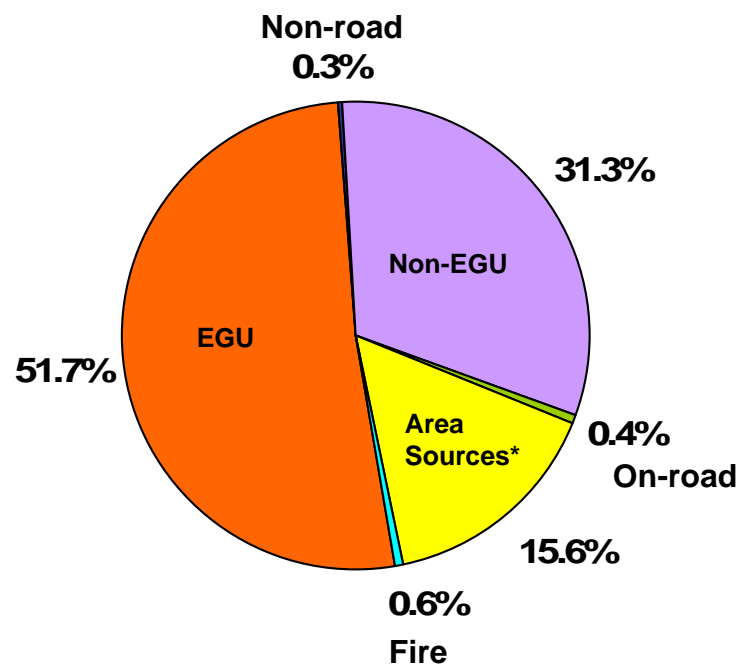
SO₂ Emissions Before and After New Regulations

2001 Baseline



15.8 million tons

2020 Post CAIR/CAMR/CAVR/PM Controls



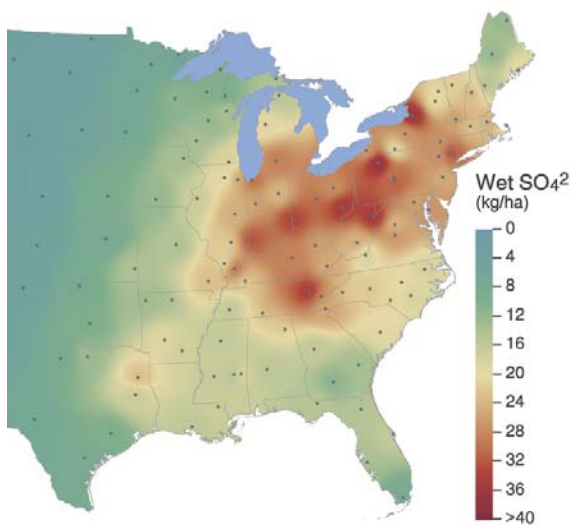
8.2 million tons

EGU = electricity generating units
 Non-road = non-road mobile including planes, trains, ships
 Fire = average year wildfires plus prescribed burning
 * = except agriculture and fires

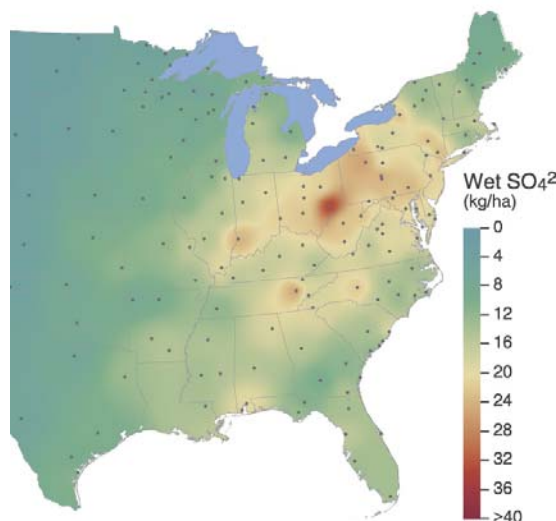
Acid Rain Program: Major Reductions in SO₂ Emissions and Acid Rain

Annual Mean Wet Sulfate Deposition

1989-91

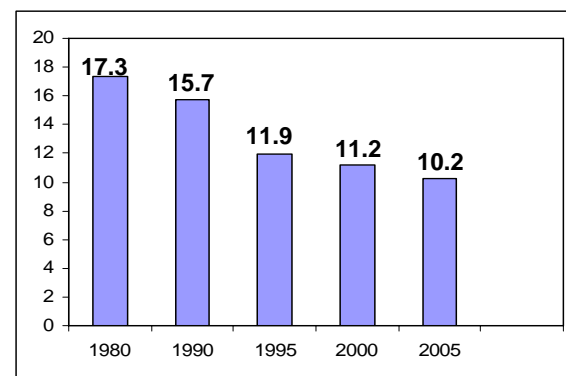


2003-05



Substantial health, visibility, and other benefits provided

Power Plant SO₂ Emissions



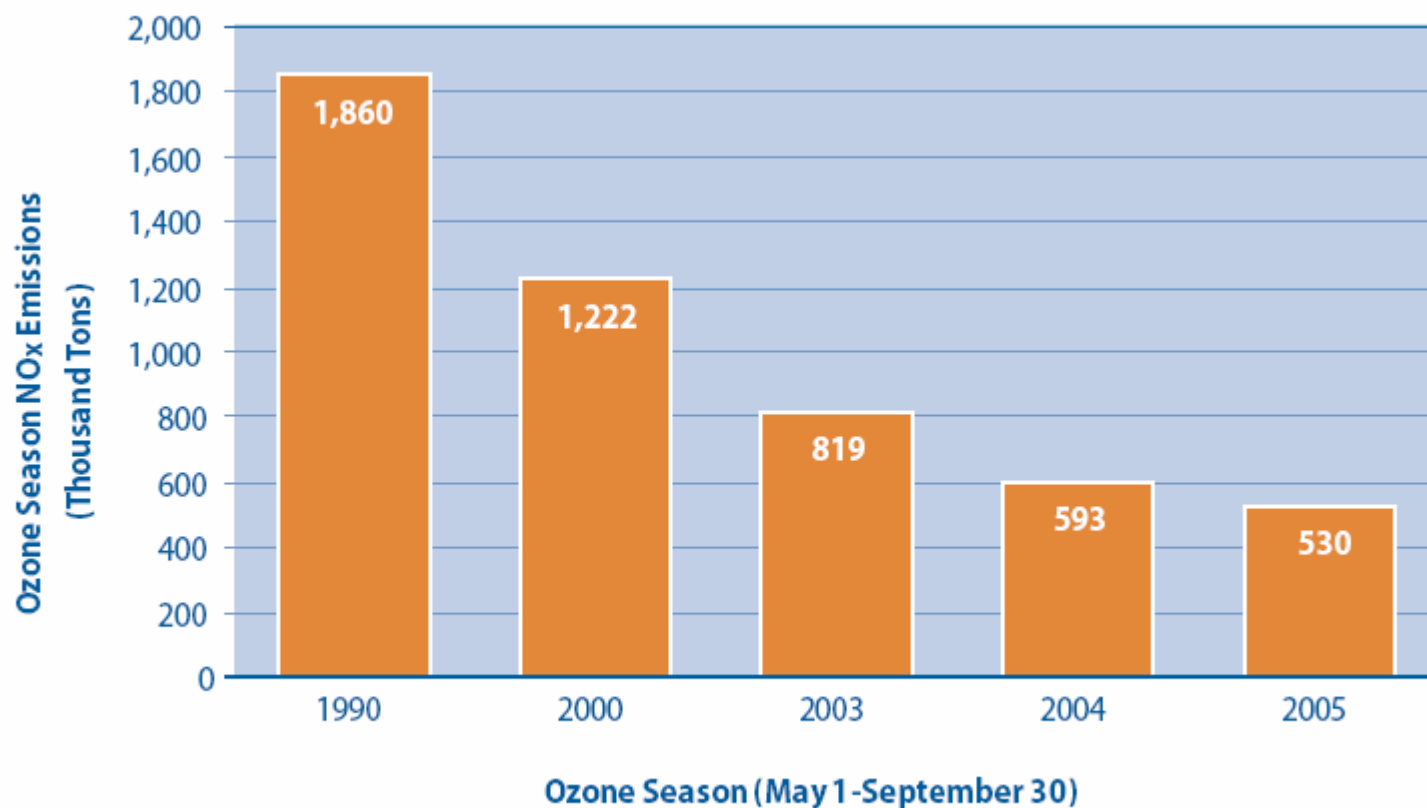
Million Tons of SO₂

SO₂ emissions down by
5.5 million tons since 1990

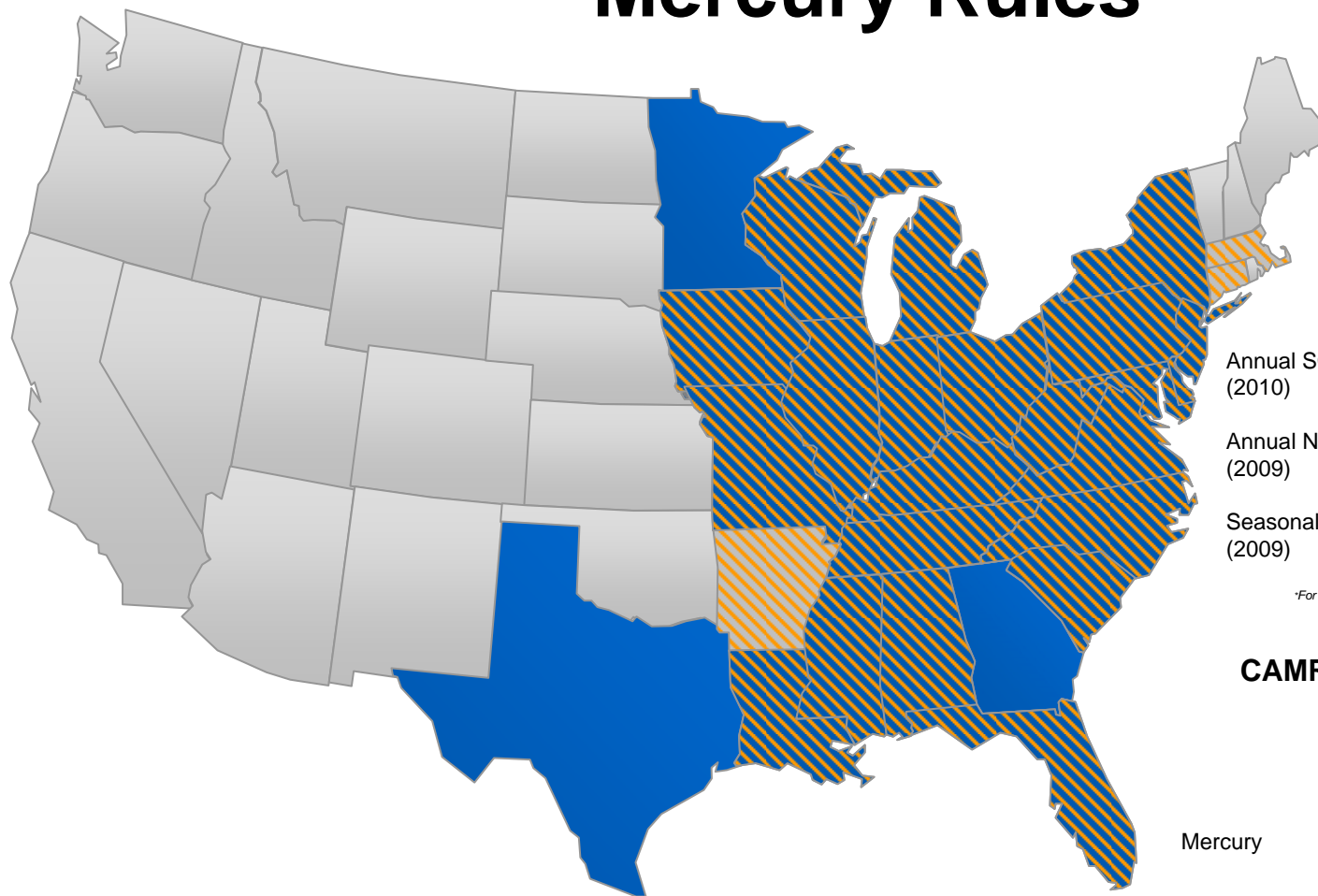


Acid rain cut by 25 –40%

Ozone Season Emissions Under the NO_x Budget Trading Program



CAIR Sets Stage for Visibility and Mercury Rules



CAIR Emission Caps*

(million tons)

	<u>2009/2010</u>	<u>2015</u>
Annual SO ₂ (2010)	3.7	2.6
Annual NO _x (2009)	1.5	1.3
Seasonal NO _x (2009)	.58	.48

*For the affected region.





CAMR Emissions Caps

(tons)

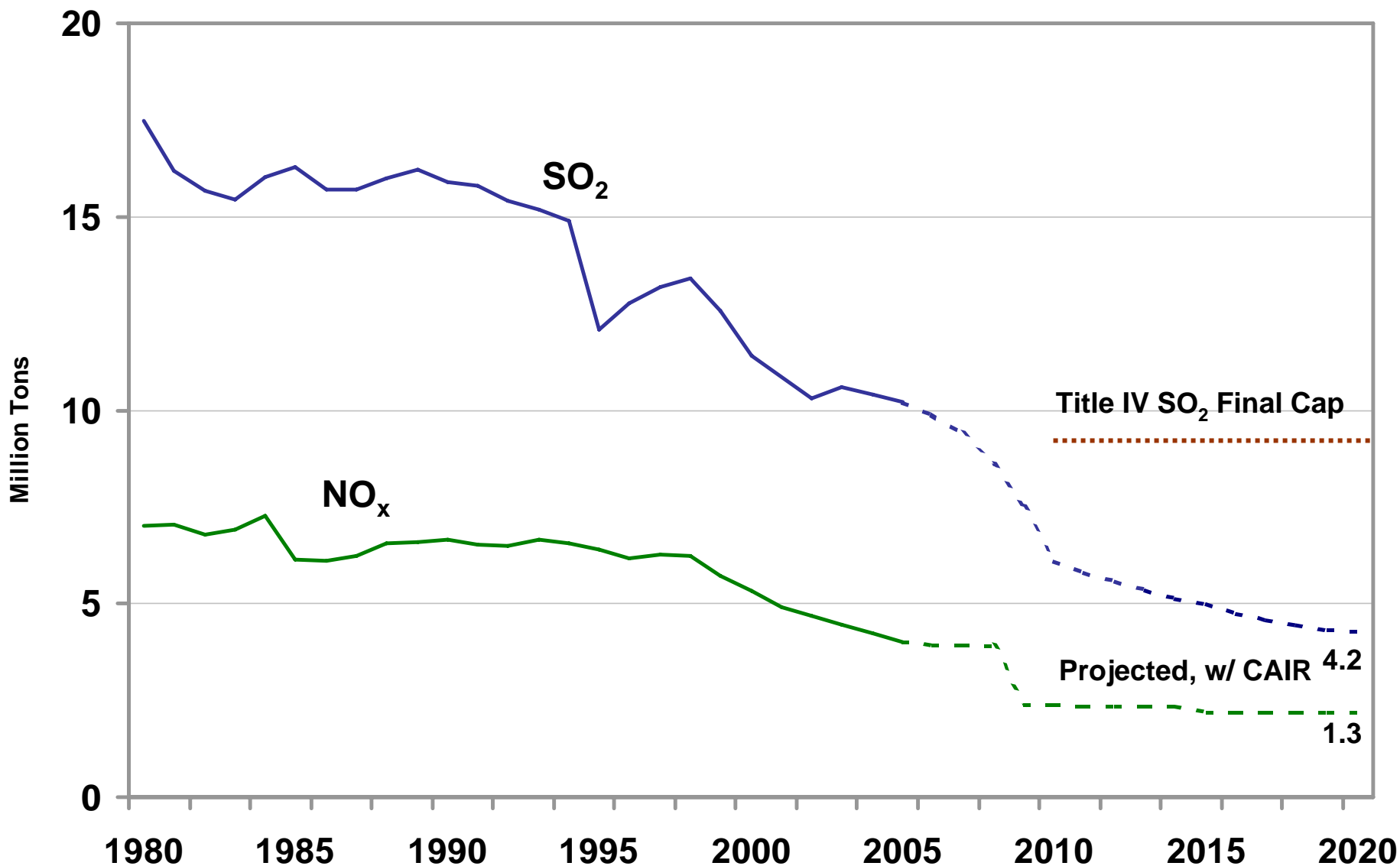
	<u>2010</u>	<u>2018</u>
Mercury	38	15

CAVR

Outside of CAIR Region – BART

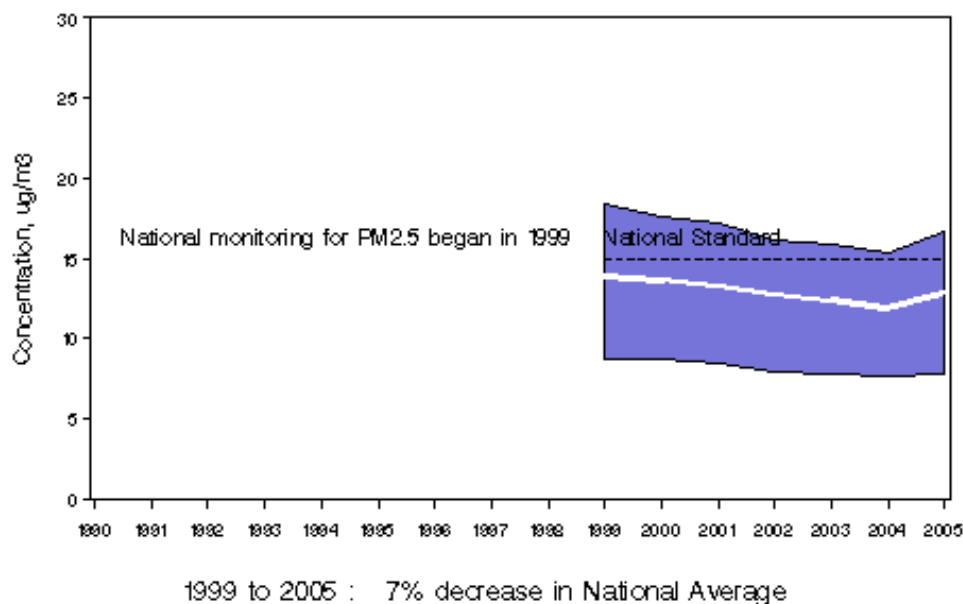
-  States not covered by CAIR
-  States controlled for fine particles (annual SO₂ and NO_x)
-  States controlled for both fine particles (annual SO₂ and NO_x) and ozone (ozone season NO_x)
-  States controlled for ozone (ozone season NO_x)

Nationwide SO₂ and NO_x Emissions from the Power Sector



- Nationwide, reductions in industrial & highway vehicle emissions of fine particles and VOCs appeared to have contributed to the improvements in PM_{2.5} concentrations. In addition, reductions in sulfur dioxide emissions from power plants resulting from implementation of the Acid Rain emissions trading program, yielded significant regional reductions.*

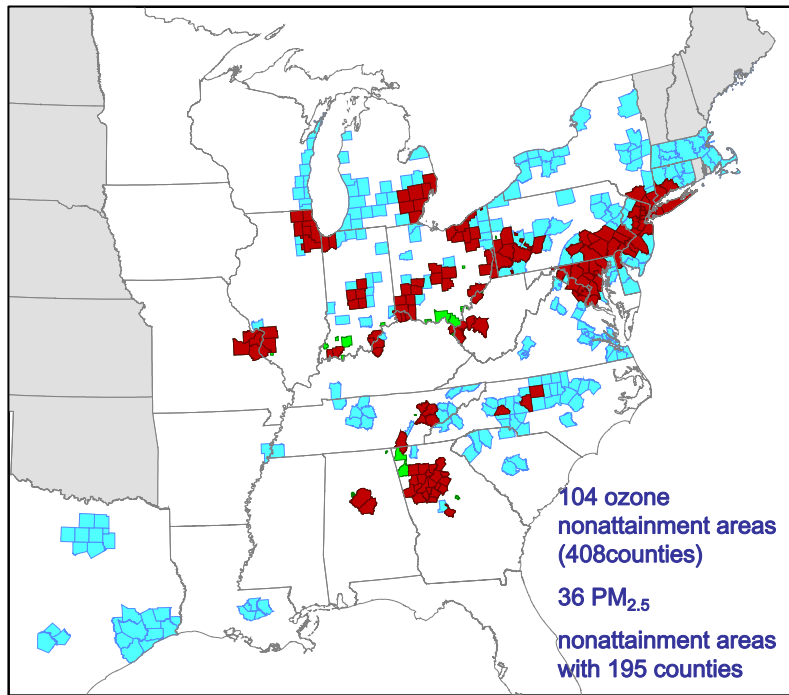
PM_{2.5} Air Quality, 1999 — 2005
 (Based on Seasonally-Weighted Annual Average)
 National Trend based on 658 Sites



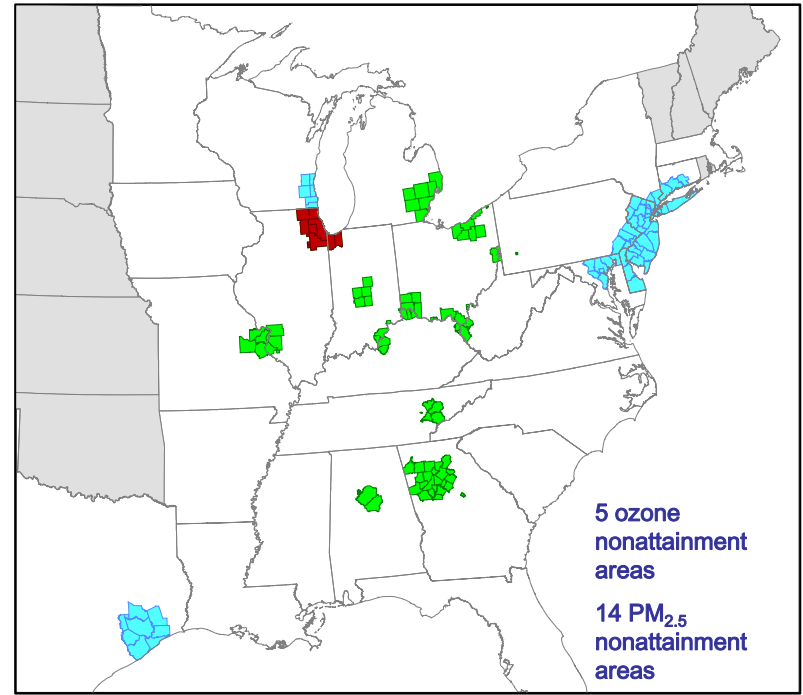
The blue band shows the distribution of air pollution levels among the trend sites, displaying the middle 80 percent. The white line represent the average among all the trend sites. Ninety percent of sites have concentrations below the top line, while ten percent of sites have concentrations below the bottom line.




CAIR and Other Clean Air Programs: Cleaner Air to Eastern US - 2015

**Ozone and Fine Particle Nonattainment
Areas (April 2005)**



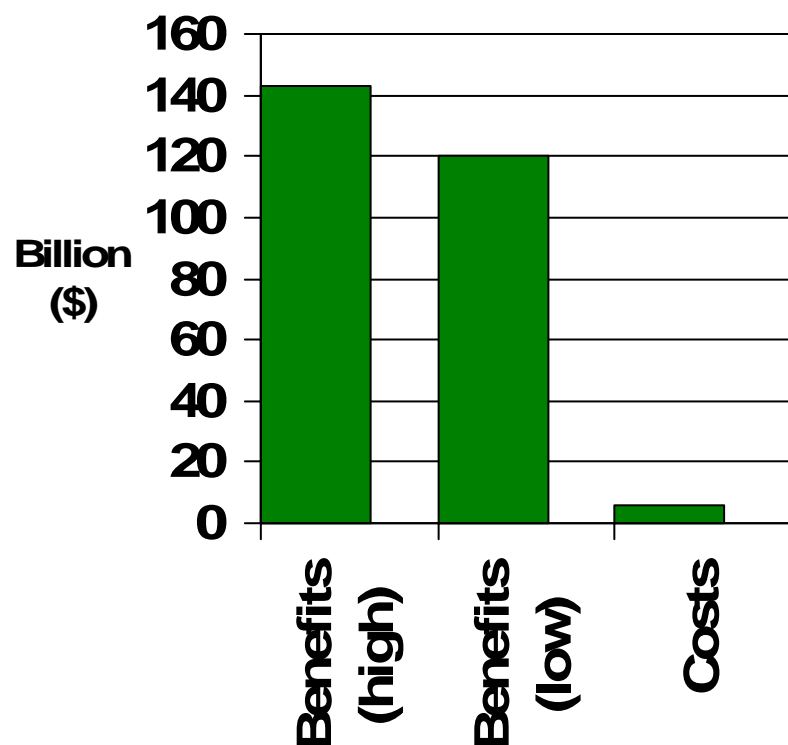
**Projected Nonattainment Areas in 2015 after Reductions
from CAIR and Existing Clean Air Act Programs**



-  Nonattainment areas for 8-hour ozone pollution only
-  Nonattainment areas for fine particle pollution only
-  Nonattainment areas for both 8-hour ozone and fine particle pollution

CAIR, CAVR, and CAMR: Benefits and Costs

Benefits v. Costs (2020)



- Extensive air emissions reductions with affordable, reliable electricity supply from diverse generation mix
- The rules help States comply with O₃ and PM NAAQS and Regional Haze Program by reducing NO_x, SO₂, and Hg emissions
- Improved air quality while creating room for growth

Transportation



Three Key Rulemakings

- ✓ Cars and light trucks
 - 1999 Tier 2 rule: set forth 90%+ emission reductions, 30 ppm sulfur levels in gasoline beginning in 2004
- ✓ Heavy-duty trucks and buses
 - 2007 highway diesel rule: combines 15 ppm cap sulfur levels and 90%+ reductions in engine emissions beginning in 2007
- ✓ Nonroad diesel engines
 - Combines 15 ppm cap sulfur levels and 90%+ reductions in engine emissions beginning in 2008.

When fully implemented in 2030 these programs will result in:
\$175 billion in annual health benefits

At a cost of:
\$12 billion annually

Twenty in Ten

- President Bush, in his January 23rd State of the Union address, called for reducing gasoline usage by 20 percent in the next 10 years (“Twenty in Ten”).
- Twenty in Ten is to be met by increasing the supply of renewable and alternative fuels by setting a mandatory fuel standard to require 35 billion gallons of such fuel in 2017.
- 35 billion gallons of renewable and alternative fuel will displace 15 percent of projected annual gasoline use in 2017. 5 percent of projected annual gasoline use will be displaced by reforming and modernizing the Corporate Average Fuel Economy (CAFE) standards for cars and extending the current rules applicable to light trucks.

The RFS – The Program Basics

- EPA must promulgate regulations that ensure the use of renewable fuels

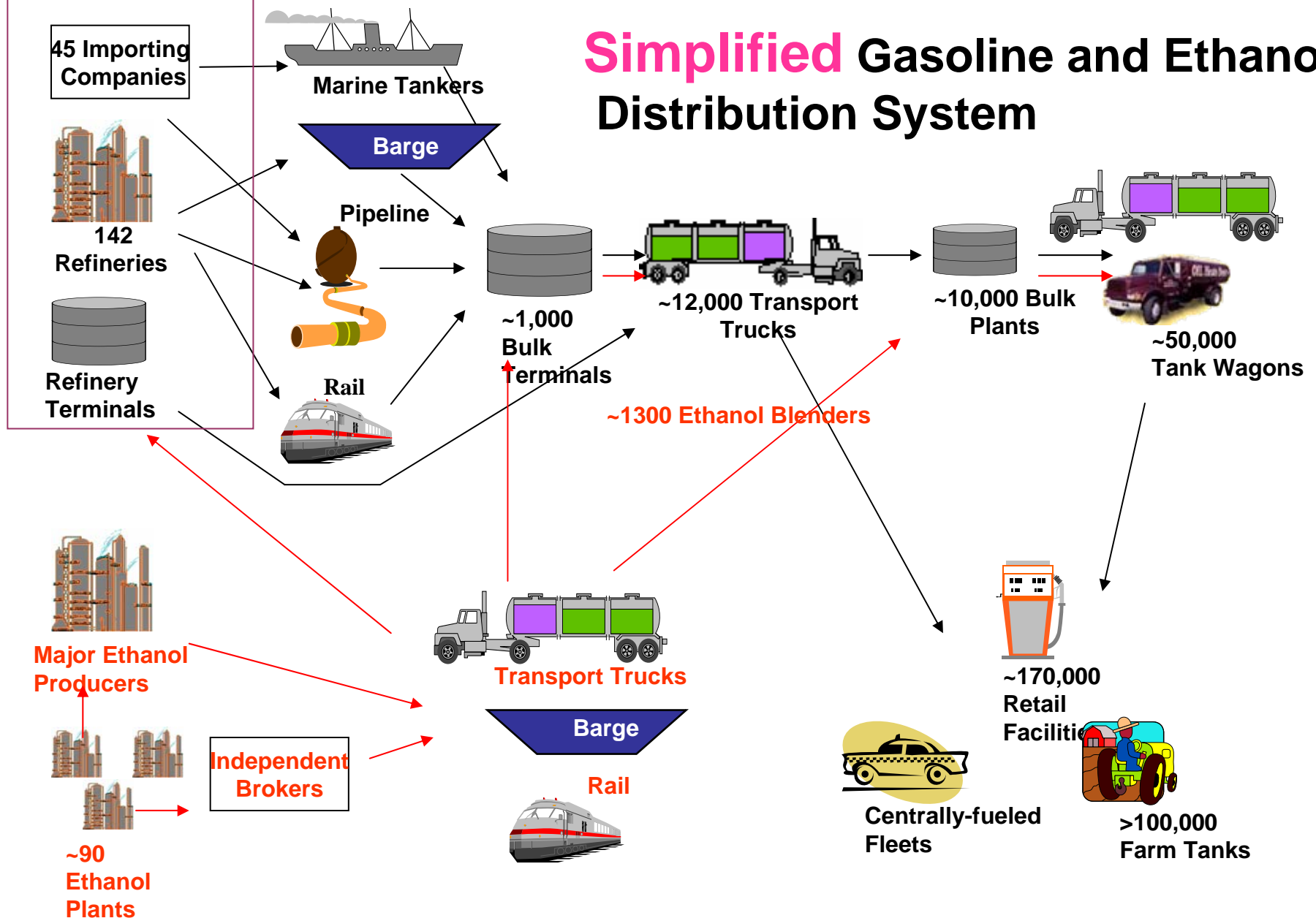
- 2006: 4.0 billion gallons/yr
- 2007: 4.7
- 2008: 5.4
- 2009: 6.1
- 2010: 6.8
- 2011: 7.4
- 2012: 7.5



- EPA must convert RFS into percent of gasoline production
 - Based on annual EIA predictions of gasoline consumption given to EPA each Oct 31
 - Applies to refiners, importers, gasoline blenders
- RFS in year 2013 and subsequent years
 - **Minimum quantity: same percent of renewables in gasoline supply for 2012 (0.25 billion gal of which must be cellulosic ethanol). Rulemaking to establish applicable amount based on impact on environment, air quality, energy security, job creation and rural economic development (section 211(o)(2)(B)(ii) of CAA)**

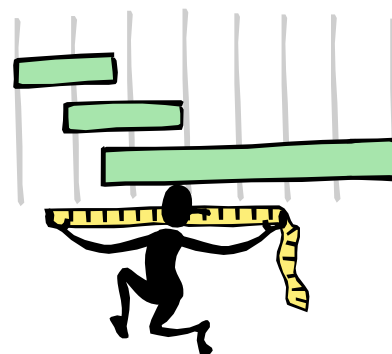
Liabel for RFS

Simplified Gasoline and Ethanol Distribution System



Opportunity for Different Renewables

- EPA Act specifies that 1 gallon of cellulosic ethanol counts as 2.5 gallons for compliance purposes
- We proposed a base value for other renewables on volumetric energy content in comparison to ethanol (adjusted for renewable content)
 - Corn-ethanol: 1.0
 - Cellulosic biomass ethanol: 2.5
 - Biodiesel (alkyl esters): 1.5
 - Renewable diesel: 1.7
 - Biobutanol: 1.3
- Sought comment on life cycle energy, petroleum, GHG emissions



Emissions & Air Quality (RFS)

	Nationwide	Localized maximum
CO	1.3 - 3.6 % decrease	N/A
Benzene	1.7 - 6.2 % decrease	N/A
NO _x + VOC	0.5 - 1.0 % increase	3 - 6 % increase
Ozone	~ 0.1 ppb increase	0.1 - 0.2 ppb increase

- Impacts will vary by region, since renewable fuel use varies significantly.

2004 Base Reference Year

Incremental Impacts From Base Reference Year to 2012 Cases

Energy and CO₂

- Petroleum consumption in the transportation sector will be reduced 1.0 - 1.6 %
 - Equivalent to 2.3 - 3.9 billion gal petroleum in 2012
 - ~95% of the reduction is estimated to be from imports
- Transportation sector greenhouse gases (CO₂ equivalent) will be reduced by 0.4 - 0.6 %
 - Equivalent to 9 - 14 million tons in 2012

2004 Base Reference Year

Incremental Impacts From Base Reference Year to 2012 Cases

Air Quality Standards



EPA's PM Standards: Old and New

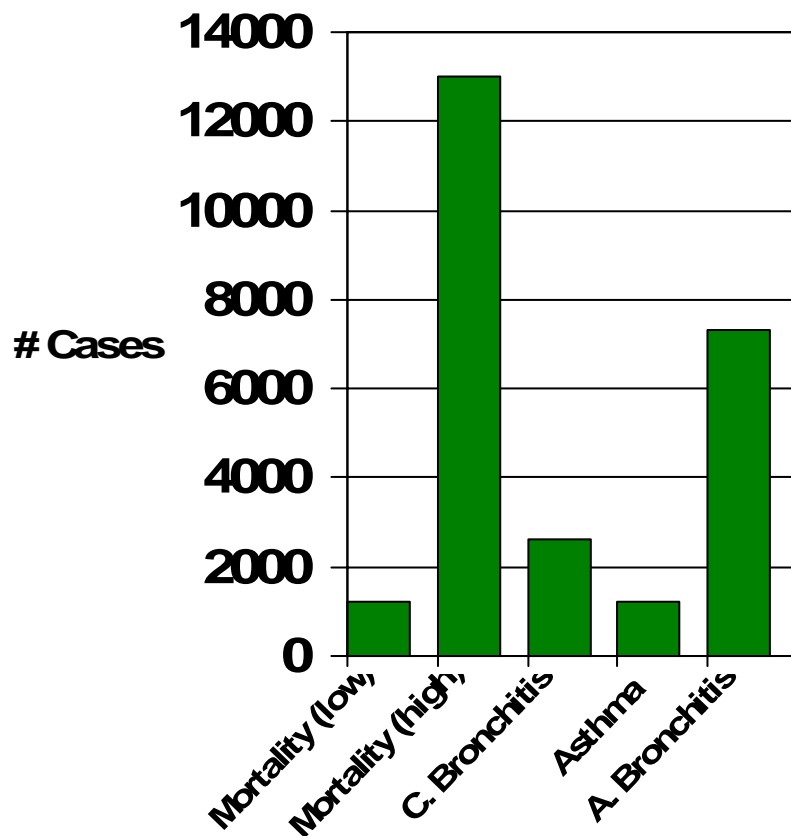
	Previous Standards		2006 Standards	
	Annual	24-hour	Annual	24-hour
PM_{2.5} (Fine Particles)	15 µg/m³ Annual average (Set in 1997)	65 µg/m³ 98 th percentile*	15 µg/m³ Annual average	35 µg/m³ 98 th percentile*
PM₁₀ (Coarse Particles)	50 µg/m³ Annual average (Set in 1987)	150 µg/m³ 1 expected exceedance**	Revoked	150 µg/m³ 1 expected exceedance**

* Averaged over 3 years

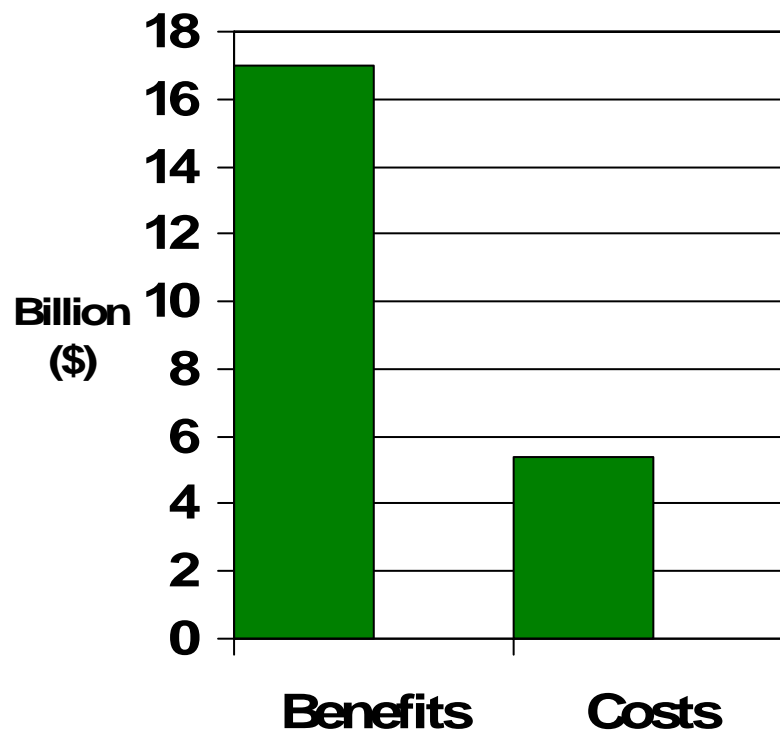
** Not to be exceeded more than once per year on average over a three year period

Benefits and Costs of New 24-Hour PM_{2.5} Standards

Avoided Health Impacts



Benefits v. Costs (2020)



Air Enforcement Cases Yield Environmental and Human Health Benefits (FY 2006)

Pollutant Reductions

- EPA's 11 largest enforcement actions for CAA violations obtained commitments by companies to reduce their emissions of sulfur oxides (SO_x) and nitrogen oxides (NO_x).
- When all required pollution controls are completed, emissions will be reduced by approximately 470 million pounds per year.



Health Benefits

- The **annual** human health benefits from these reductions in SO_x and NO_x are estimated at \$3.5 billion. These health benefits include:
 - approximately 500 fewer premature deaths in people with heart or lung disease;
 - several hundred fewer cases of chronic bronchitis and acute bronchitis;
 - several hundred fewer nonfatal heart attacks;
 - a few thousand fewer cases of upper and lower respiratory symptoms;
 - a few thousand fewer cases of upper aggravated asthma; and
 - tens of thousands of fewer days when people would miss work or school.

Where Do We Go From Here?



Opportunities and Challenges

- **Ethanol/Biofuels/Alternative Fuels**
 - Clear need for utilization of biomass-based products
 - New technologies (e.g., bio-butanol, cellulosic ethanol)
 - Diversification of energy supply
- **Coal**
 - Department of Energy Clean Coal Programs
 - FutureGen
 - Carbon Capture/Sequestration
- **Non-EGU sources**
- **Hybrids and Plug-in HEV**
 - Shift mobile fleet dependency on petroleum-based products to alternative fuels and electricity
 - Efficiency gains – 20% reduction gasoline usage in 10 years
- **National Security**
 - Address domestic dependency on foreign oil imports
- **Hydrogen Economy**

Paradigm Shift in Thinking

- **How can we better integrate evolving information?**
 - Multipollutant and multimedia
 - Community/Local-based initiatives for residual nonattainment issues
 - Sector-based and voluntary strategies
 - Transboundary & hemispheric air pollution transport
- **How do we encourage cross-functional integration?**
 - Agriculture as an energy solution
 - Trade/commerce and energy efficiency
- **How can we do a better job of harnessing the market to achieve clean air & energy?**
 - Voluntary partnerships